

## CAST IN PLACE TACTILE / DETECTABLE WARNING SURFACE TILES

### PART 1 – GENERAL

#### **1.01 DESCRIPTION**

- A. This Section includes Specifications for furnishing and installing permanently embedded Cast In Place Tactile / Detectable Warning Surface Tiles (CIP) with an in-line truncated dome pattern embedded in all curb ramps at the locations and to the dimensions shown on the Drawings, in accordance with the Contract Documents and as directed by the Engineer.

#### **1.02 RELATED DOCUMENTS**

- A. Drawings and general provisions of the Contract, including General and Special Conditions and Division 1 Specifications, apply to this Section.
- B. Americans with Disabilities Act (ADA) Title 49 CFR Transportation, Part 37.9 Standards for Accessible Transportation Facilities, Appendix A, Section 4.29.2 Detectable Warnings on Walking Surfaces. FHA Memo (5-06-02) titled Truncated Domes. Federal Register Volume 71, No. 209, 49 CFR Part 37 (10-30-06), ADA Standards for Transportation Facilities (11-29-06, DOT): Sections 406, 705, and 810. ADA Standards for Accessible Design – 2010 (9/05/11, DOJ), ADAAG: Sections 705 and 810. Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Rights of Way (7/23/11, Access Board), PROWAG: Sections R208, R304, R305, R308, and R309.
- C. American Society for Testing and Materials (ASTM) Test Methods B117, C501, C1028, D543, D570, D638, D695, D790, G151, G155, and E84.
- D. American Association of State Highway and Transportation Officials (AASHTO): Test Method AASHTO-H20.
- E. California Code of Regulations (CCR 2007) Title 24 Part 1 Articles 2, 3 and 4, and Part 2 Section 205 definition of “Detectable Warning”, Section 1127B.5 for “Curb Ramps”, and Section 1133B.8.5 for “Detectable Warnings at Hazardous Vehicle Areas”. California Department of Transportation Detectable Warning Surface Authorized Material List. Division of the State Architect IR 11B-3 (1/26/05) and IR 11B-4 (1/01/11). IR 11B-4 (1/01/11) removed the requirement for a “staggered” pattern and now calls for the “square grid” (in-line) pattern.

#### **1.03 SUBMITTALS**

- A. Product Data: Submit manufacturer’s literature describing products, installation procedures and maintenance instructions.

- B. Samples for Verification Purposes: Submit two (2) Tactile Warning Surface samples minimum 8" x 8" of the kind proposed for use. Samples shall be properly labeled and shall contain the following information: Name of Project, Submitted by, Date of Submittal, Manufacturer's Name, and Catalog Number.
- C. Shop Drawings: Submit Standard Manufacturer Shop Drawings showing all pertinent characteristics of the Composite Shell Cast In Place Tactile Warning Surface Tile (CIP), including profile, sound on cane contact amplification feature and installation methods.
- D. Material Test Reports: Submit current test reports from qualified, accredited independent testing laboratory in accordance with ASTM guidelines and indicating that materials proposed for use are in compliance with specification requirements and meet the properties indicated. All test reports submitted shall be representative of the Composite Shell Cast In Place Tactile Warning Surface Tile (CIP) delivered to the Project.
- E. Maintenance Instructions: Submit copies of manufacturer's specified maintenance practices for each type of Tactile Warning Surface Tile and accessory.

#### **1.04 QUALITY ASSURANCE**

- A. Provide Cast In Place Tactile Warning Surface Tiles (CIP) and accessories as produced by a single manufacturer with a minimum of five years experience in manufacturing Cast In Place Composite Shell Tactile Warning Surface Tiles.
- B. Installer's Qualifications: Engage an experienced installer certified in writing by the Tactile Warning Surface manufacturer, who has successfully completed Tactile Warning Surface installations similar in material, design, and extent to that indicated for the Contract.
- C. Cast In Place Tactile Warning Surface Tiles (CIP) must be compliant with ADAAG, PROWAG, and California Title 24 requirements. Division of the State Architect IR 11B-3 (1/26/05) and IR 11B-4 (1/01/11). IR 11B-4 (1/01/11) removed the requirement for a "staggered" pattern and now calls for the "square grid" (in-line) pattern.
- D. Cast In Place Tactile Warning Surface Tiles (CIP) shall meet or exceed the following test criteria using the most current test methods:
  - 1. Compressive Strength: 28,900 psi minimum, when tested in accordance with ASTM D695.
  - 2. Flexural Strength: 29,300 psi minimum, when tested in accordance with ASTM D790.
  - 3. Water Absorption: Not to exceed 0.10%, when tested in accordance with ASTM-D570.
  - 4. Slip Resistance: 1.05 minimum wet and 1.18 dry static coefficient of friction when tested in accordance with ASTM C1028.
  - 5. Flame Spread: 25 maximum, when tested in accordance with ASTM E84.

6. Salt and Spray Performance of Tactile Warning Surface: No deterioration or other defects after 200 hours of exposure, when tested in accordance with ASTM-B117.
7. Chemical Stain Resistance: No reaction to 1% hydrochloric acid, motor oil, calcium chloride, gum, soap solution, bleach, and antifreeze, when tested in accordance with ASTM D543.
8. Abrasion Resistance: 500 minimum, when tested in accordance with ASTM C501.
9. Accelerated Weathering of Tactile Warning Surface when tested by ASTM-G155 or ASTM G151 shall exhibit the following result:  $\Delta E < 5.0$  at 2,000 hours minimum exposure.
10. Tensile Strength: 11,600 psi minimum, when tested in accordance with ASTM D638.
11. AASHTO-H20 Load Bearing Test: No Damage at 16,000# loading.
12. Freeze/Thaw/Heat: No deterioration when tested in accordance with ASTM C 1026.

#### **1.05 DELIVERY, STORAGE AND HANDLING**

- A. Cast In Place Tactile Warning Surface Tiles (CIP) shall be suitably packaged or crated to prevent damage in shipment or handling. Finished surfaces shall be protected by sturdy wrappings.
- B. Storage Facility
  1. Store CIP Tiles in an area that is within an acceptable temperature range (40-90 degrees).
  2. Maintain Storage Facility in a clean dry condition to prevent contamination or damage to CIP Tiles.

#### **1.06 GUARANTEE**

- A. CIP Tiles shall be guaranteed in writing for a period of five (5) years from date of Contract's final completion. The guarantee includes manufacturing defects, breakage, and deformation.

### **PART 2 – PRODUCTS**

#### **2.01 MATERIALS**

- A. Composition: CIP Tiles shall be manufactured using a matte finish exterior grade homogeneous (uniform color throughout thickness of product) glass and carbon reinforced polyester based Sheet Molding Compound (SMC) composite material. Truncated domes must contain fiberglass reinforcement within the truncated dome for superior structural integrity and impact resistance. A matte finish will be required on the Tactile Warning Surface for superior slip resistance performance superior to that offered by a gloss finish. Use of Tactile Warning Surface Products employing coatings or featuring layers of material with differing composition, performance, or color properties is expressly prohibited under this Section.

- B. Color: Color shall be homogeneous throughout CIP Tile.
1. Federal Yellow (Y) per Federal Standard 595B Table IV, Color No. 33538.
  2. Brick Red (R) per Federal Standard 595B Table IV, Color No. 20109.
  3. Clay Red (CR) per Federal Standard 595B Table IV, Color No. 22144.
  4. Safety Red (SR) per Federal Standard 595B, Table IV, Color No. 31350.
  5. Black (B) per Federal Standard 595B Table IV, Color No. 37038.
  6. Dark Gray (G) per Federal Standard 595B Table IV, Color No. 36118.
  7. Safety Blue (B) per Federal Standard 595B Table IV, Color No. 15187.
  8. White (W) per Federal Standard 595B Table IV, Color No 37925.
  9. Seattle Yellow (SY) per Federal Standard 595B Table IV, Color No. 23594.
  10. Houston Beige (Pantone #7529C).
- C. Domes: Square grid pattern of raised truncated domes of 0.2" nominal height, base diameter of 0.9" and top diameter of 0.45". The Federal Code of Regulations permits a truncated dome spacing range of 1.6"-2.4." For superior wheelchair, walker and shopping cart mobility, the preferred truncated dome spacing shall have a center-to-center (horizontally and vertically) spacing of 2.35", measured between the most adjacent domes on square grid.
- D. Configuration: CIP Tile sizes shall be as indicated on the Contract Drawings. For superior load bearing capacity, CIP Tile shall feature internal embedment ribs at 3" on center maximum. The field area shall consist of a non-slip textured surface with a minimum static coefficient of friction of 0.80, wet and dry. At a minimum, CIP Tile thickness shall measure 0.20" (nominal).
1. The field area shall consist of a non-slip textured surface with a minimum static coefficient of friction of 0.80, wet and dry.
- E. Truncated Dome Surface of Composite CIP Tile shall be protected with factory installed plastic sheeting for cleanliness during the installation process. Basic Installation Guidelines shall be printed on the plastic sheeting in both English and Spanish for customer convenience.
- F. Dimensions: Cast In Place Tactile Warning Surface Tiles shall be held within the following dimensions and tolerances:

*Specifiers Note: Edit section below by selecting desired length and width. Delete non-relevant dimensions.*

2. Length and Width:
  - 1.67" Dome Spacing: [24"x36"] [24"x48"] [24"x60"] [36"x48"] [36"x60"]
  - 2.35" Dome Spacing: [24"x36"] [24"x48"] [24"x60"] [36"x48"] [36"x60"]

- G. Cleaning materials used on site shall have code acceptable low VOC solvent content and low flammability.
- H. The Specifications of the concrete, sealants and related materials shall be in accordance with the Contract Documents and the guidelines set by their respective manufacturers.

## **2.02 MANUFACTURERS**

- A. Available manufacturers, subject to compliance with these Specifications include, but are not limited to, the following:
  - 1. ADA Solutions Inc. of Chelmsford, MA (Phone: 800-372-0519, Fax: 978-262-9125, Web Site: [www.adatile.com](http://www.adatile.com) , E: [info@adatile.com](mailto:info@adatile.com) ), or approved equal.
  - 2. Requests for Approved Equal Status must be submitted and approved by the Owner during the Bid Phase of the Project.

## **2.03 EQUIPMENT**

- A. Contractor shall provide all tools, equipment and services required for satisfactory installation per manufacturer's instruction as Incidental Work. Equipment, which may be required include typical mason's tools, a 4-foot long level with electronic slope readout, 25-pound weights, vibrator and rubber mallet with 2" x 4" x 10" wood tamping plate, and a device for cutting the Tactile Warning Surface Product.

## **PART 3 – EXECUTION**

### **3.01 PREPARATION**

- A. During all concrete pouring and CIP Tile Installation procedures, ensure adequate safety guidelines are in place and that they are in accordance with the applicable industry and government standards.
- B. The physical characteristics of the concrete shall be consistent with the Contract Specifications while maintaining a slump range of 4 - 7 to permit solid placement of the CIP Tile. An overly wet mix will cause the CIP Tile to float. Under these conditions suitable weights such as 2 concrete blocks or sandbags (25 pounds) shall be placed on each CIP Tile.
- C. The concrete shall be poured and finished, true and smooth to the required dimensions and slope prior to CIP Tile placement.

### **3.02 INSTALLATION**

- A. Contractor will not be allowed to install Tactile Warning Surface Tiles until all submittals have been reviewed and approved by the Engineer.
- B. CIP Tile shall be installed per manufacturer's instructions.

- C. To the maximum extent possible, the CIP Tiles shall be oriented such that the rows of in-line truncated domes are parallel with the direction of the ramp. When multiple CIP Tiles regardless of size are used, the truncated domes shall be aligned between the tactile warning surface Tiles and throughout the entire tactile warning surface installation.
- D. In accordance with the Proposed Accessibility Guidelines for Pedestrian Facilities in the Public Rights of Way (7/23/11, Access Board): Sections 304 + 305), Tactile Warning Surface Tile shall be located relative to the curb line as shown within Sections 304+305 of the Guidelines.
- E. CIP Tiles shall be tamped or vibrated into the fresh concrete to ensure that there are no voids or air pockets, and the field level of the CIP Tile is flush to the adjacent concrete surface or as the Drawings indicate to permit proper water drainage and eliminate tripping hazards between adjacent finishes.
- F. Cutting and Setting of CIP Tiles shall be cut into size and configuration indicated on the Drawings using a 60 tooth carbide blade on a table saw or equivalent cutting device. Minimize any cantilever effect (to the maximum extent practicable) when cutting between successive embedment ribs as concrete will tend to flow up and over the CIP Tiles. The top of the body of the CIP Tiles shall be fully seated and flush with the adjacent concrete substrate. For specific instructions for cutting and setting refer to Tactile Warning Surface manufacturer's written instructions.

### **3.03 CLEANING AND PROTECTING**

- A. Protect CIP Tiles against damage during construction period to comply with CIP Tiles manufacturer's Specifications.
- B. During and after the CIP Tiles installation and the concrete curing stage, it is imperative that there are no walking, leaning or external forces placed on the CIP Tiles to rock the CIP Tile, causing a void between the underside of the CIP Tile and the concrete.
- C. Remove Protective Plastic Sheeting from CIP Tile within 24 hours of installation of the CIP Tile. Particularly under hot weather conditions (80 degrees or higher), plastic sheeting will adhere strongly (resulting in difficult removal of same) to Tactile Warning Surface Tile when not removed quickly.
- D. If requested by the Project Manager, clean CIP Tiles not more than four (4) days prior to date scheduled for inspection intended to establish date of substantial completion in each area of project. Clean CIP Tile by method specified by Tactile Warning Surface Products manufacturer.

END OF SECTION  
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